

Gunter, Jason

From: James, Kevin <kjames@doerun.com>
Sent: Monday, April 13, 2015 10:25 AM
To: Gunter, Jason
Cc: Yingling, Mark; Neaville, Chris; Montgomery, Michael; 'martin.kator@dnr.mo.gov'; 'brandon.wiles@dnr.mo.gov'; 'Ty Morris (TMorris@barr.com)'
Subject: Federal Progress Report - March
Attachments: removed.txt; Federal_ProgressReport_03-15.pdf; Remediation Air Report - February 2015.pdf; Pb Results By Month January 2015_017.pdf

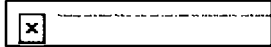
Jason -

Attached is the March Progress Report for the Federal Site.

Best regards,

Kevin James

Kevin James



Construction Engineering
W: 573.626.2096
C: 573.247.6766

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THE
DOE RUN
COMPANY

Remediation Group

Kevin James
Construction Engineering Manager
kjames@doerun.com

April 13, 2015

Mr. Jason Gunter
Remedial Project Manager
U.S. Environmental Protection Agency
Region 7 - Superfund Branch
11201 Renner Blvd.
Lenexa, KS 66219

Re: The Doe Run Company – Federal Mine Tailings Site Monthly Progress Report

Dear Mr. Gunter:

As required by Article XVII, Paragraph 73 of the Administrative Order on Consent (Docket No. VII-97-F-0009) for the referenced project and on behalf of The Doe Run Company, the progress report for the period March 1, 2015 through March 31, 2015 is enclosed. If you have any questions or comments, please call me at 573-626-2096.

Sincerely,



Kevin James
Construction Engineering Manager

Enclosure

- c: Mark Yingling – TDRC (electronic only)
- Chris Neaville – TDRC (electronic only)
- Michael Montgomery – TDRC (electronic only)
- Martin Kator – MDNR DSP
- Brandon Wiles – MDNR HWP
- Ty Morris – Barr Engineering

35 Iron County Rd. #1, Viburnum, MO 65566
Telephone: (573) 626-2096

Federal Mine Tailings Site
Park Hills, Missouri
Monthly Progress Report
Period: March 1, 2015 – March 31, 2015

1. Actions Performed or Completed This Period:

- a. Work continued on the development of the Post-Removal Site Control Plan for the site.
- b. Work continued on the development of the Removal Action Report.
- c. A walk-through of the site was conducted on March 17, 2015 including staff from Doe Run, EPA, and MDNR. During the walk-through the northwest section of the Off-Road Vehicle (ORV) Riding Area has some areas that hold water and do not drain per the original design. The group discussed design modifications to alleviate some of these areas.

2. Data and Results Received This Period:

- a. The lead monitoring results for the Missouri Department of Natural Resources – Department of State Parks (MDNR-DSP) air monitor located near the Off-Road Vehicle (ORV) Riding Area for January 2015 are attached. Neither The Doe Run Company nor Barr Engineering Co. were involved with siting this monitor, collecting the samples, processing the samples, evaluating the data, or verifying the accuracy of the data.
- b. During this period, the ambient air monitoring samples for February were processed and the Ambient Air Monitoring Report for February 2015 was completed. A copy of the Ambient Air Monitoring Report for February is attached.

3. Planned Activities for Next Period:

- a. Continue developing the Post-Removal Site Control Plan for the site.
- b. Continue developing the Removal Action Report.
- c. Barr will begin the design modifications to help the northwest section of the ORV Riding Area drain properly.

4. Changes in Personnel:

- a. None.

5. Issues or Problems Encountered and the Resolution:

- a. None.

Air Quality Monitoring Pb results for January 2015

St. Joe State Park

Primary

AQM Pb results for November 2014					AQM Pb results for December 2014				
St. Joe State Park					St. Joe State Park				
Primary					Primary				
Sample Number	Date Collected	Sampler:	Result		Sample Number	Date Collected	Sampler:	Result	
AC39046	11/1/2014	#1 Primary	0.0729	µg/m³	AC39929	12/16/2014	#1 Primary	0.0035	µg/m³
AC39064	11/4/2014	#1 Primary	0.0049	µg/m³	AC39936	12/19/2014	#1 Primary	0.0035	µg/m³
AC39082	11/7/2014	#1 Primary	0.0039	µg/m³	AC39942	12/22/2014	#1 Primary	0.0035	µg/m³
AC39100	11/10/2014	#1 Primary	0.0061	µg/m³	AC39948	12/25/2014	#1 Primary	0.0035	µg/m³
AC39118	11/13/2014	#1 Primary	0.0150	µg/m³	AC39954	12/28/2014	#1 Primary	0.0035	µg/m³
AC39125	11/16/2014	#1 Primary	0.0053	µg/m³					
November Sum	0.1081	November Average	0.018016666666667 µg/m³		December Sum	0.0175	December Average	0.0035 µg/m³	
Run Days Scheduled:	10	Actual:	6	November Data Capture Rate	60.000%	Run Days Scheduled:	11	Actual:	5
						December Data Capture Rate	45.455%		

Sample Number	Date Collected	Site:	Result
AC41486	1/6/2015	St. Joe State Park - #1 Primary	0.0302 µg/m³
AC41504	1/9/2015	St. Joe State Park - #1 Primary	0.0826 µg/m³
AC41522	1/12/2015	St. Joe State Park - #1 Primary	0.0059 µg/m³
AC41531	1/15/2015	St. Joe State Park - #1 Primary	0.0099 µg/m³
AC41538	1/18/2015	St. Joe State Park - #1 Primary	0.0173 µg/m³
AC41544	1/21/2015	St. Joe State Park - #1 Primary	0.0116 µg/m³
AC41550	1/24/2015	St. Joe State Park - #1 Primary	0.0095 µg/m³
AC41555	1/27/2015	St. Joe State Park - #1 Primary	0.0044 µg/m³
AC41574	1/30/2015	St. Joe State Park - #1 Primary	0.0075 µg/m³
January Sum	0.1789	January Average	0.0198777777778 µg/m³
Run Days Scheduled:	10	Actual:	9
January Data Capture Rate	90.000%		

Three month rolling average: 0.01 µg/m³

Three Month Data Capture Rate: 65%

Monthly Ambient Air Monitoring Report

The Doe Run Company
Old Lead Belt Sites:
Federal, Rivermines, National, and Leadwood

February-2015



SUITE 300
1801 PARK 270 DRIVE
ST. LOUIS, MO 63146

Federal Site

Sample Results for **February-2015**

Sample Date	St. Joe (Ballfields)		Big River#4		Water Treatment Plant	
	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3
2/2/15	5	0.007	12	0.006	8	0.007
2/3/15	12	0.007	8	0.006	14	0.013
2/4/15	invalid	invalid	11	0.000	18	0.007
2/5/15	13	0.013	9	0.006	13	0.006
2/6/15	12	0.007	8	0.006	11	0.007
2/9/15	invalid	invalid	8	0.006	11	0.007
2/10/15	13	0.007	invalid	invalid	13	0.007
2/11/15	17	0.007	12	0.006	13	0.020
2/12/15	16	0.006	11	0.006	13	0.006
2/13/15	25	0.007	21	0.006	26	0.007
2/16/15	15	0.000	15	0.000	12	0.006
2/17/15	19	0.007	10	0.007	16	0.007
2/18/15	17	0.006	15	0.006	21	0.058
2/19/15	20	0.006	20	0.006	18	0.006
2/20/15	7	0.007	3	0.006	5	0.007
2/23/15	22	0.019	23	0.006	22	0.006
2/24/15	25	0.020	16	0.006	20	0.013
2/25/15	21	0.013	23	0.013	18	0.007
2/26/15	21	0.007	12	0.000	14	0.013
2/27/15	16	0.012	9	0.006	14	0.006

Monthly Avg. TSP	16	13	15
Monthly Avg. Pb	0.009	0.006	0.011
Jan-15	0.015	0.008	0.025
Dec-14	0.009	0.005	0.009
Rolling 3-Month	0.011	0.006	0.015

Three month rolling average must be less than 0.15 ug/m3

NOTES:

St. Joe: 2/4, 2/9, <23hr run time

Big River #4: 2/10, <23hr run time

Sample Date	Big River QA	
	TSP ug/m3	Lead ug/m3
2/3/15	9	0.007
2/5/15	10	0.006
2/10/15	18	0.006
2/12/15	15	0.006
2/17/15	13	0.006
2/19/15	16	0.006
2/24/15	17	0.006
2/26/15		

Rivermines

Sample Results for **February-2015**

	Big River #4		Rivermines South #1		Rivermines North #2		Rivermines East #3	
Sample Date	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3
2/2/15	12	0.006	7	0.006	5	0.007	8	0.007
2/3/15	8	0.006	20	0.013	invalid	invalid	14	0.013
2/4/15	11	0.000	14	0.013	13	0.007	18	0.007
2/5/15	9	0.006	21	0.006	13	0.019	13	0.006
2/6/15	8	0.006	15	0.006	15	0.134	11	0.007
2/9/15	8	0.006	9	0.006	invalid	invalid	11	0.007
2/10/15	invalid	invalid	17	0.013	10	0.007	13	0.007
2/11/15	12	0.006	24	0.065	invalid	invalid	13	0.020
2/12/15	11	0.006	15	0.006	14	0.007	13	0.006
2/13/15	21	0.006	26	0.006	19	0.007	26	0.007
2/16/15	15	0.000	11	0.006	12	0.007	12	0.006
2/17/15	10	0.007	21	0.013	13	0.007	16	0.007
2/18/15	15	0.006	15	0.006	12	0.006	21	0.058
2/19/15	20	0.006	20	0.006	16	0.006	18	0.006
2/20/15	3	0.006	invalid	invalid	2	0.020	5	0.007
2/23/15	23	0.006	24	0.012	28	0.013	22	0.006
2/24/15	16	0.006	17	0.013	17	0.007	20	0.013
2/25/15	23	0.013	21	0.013	22	0.007	18	0.007
2/26/15	12	0.000	12	0.007	15	0.007	14	0.013
2/27/15	9	0.006	15	0.024	20	0.006	14	0.006

Monthly Avg. TSP	13	17	14	15
Monthly Avg. Pb	0.006	0.013	0.016	0.011
Jan-15	0.008	0.030	0.025	0.025
Dec-14	0.005	0.023	0.006	0.009
Rolling 3-Month	0.006	0.022	0.016	0.015

Three month rolling average must be less than 0.15 ug/m3

NOTES:

Big River #4: 2/10, <23hr run time

Rivermines South: 2/20, >25hr run time

Rivermines North #2: 2/3, <23hrs, timer set wrong by trainee,

2/9, <23hrs, bad bearing, 2/11, >25hr run time

	Big River QA	
Sample Date	TSP ug/m3	Lead ug/m3
2/3/15	9	0.007
2/5/15	10	0.006
2/10/15	18	0.006
2/12/15	15	0.006
2/17/15	13	0.006
2/19/15	16	0.006
2/24/15	17	0.006

National Site

Sample Results for **February-2015**

	Big River #4		Ozark #1		Soccer Park #2		Water Treatment Plant	
Sample Date	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3
2/2/15	12	0.006	13	0.006	10	0.013	8	0.007
2/3/15	8	0.006	14	0.007	12	0.013	14	0.013
2/4/15	11	0.000	11	0.006	invalid	invalid	18	0.007
2/5/15	9	0.006	invalid	invalid	25	0.038	13	0.006
2/6/15	8	0.006	14	0.007	19	0.020	11	0.007
2/9/15	8	0.006	8	0.000	13	0.007	11	0.007
2/10/15	invalid	invalid	21	0.007	22	0.026	13	0.007
2/11/15	12	0.006	22	0.007	14	0.007	13	0.020
2/12/15	11	0.006	16	0.006	16	0.007	13	0.006
2/13/15	21	0.006	27	0.007	27	0.013	26	0.007
2/16/15	15	0.000	17	0.006	16	0.000	12	0.006
2/17/15	10	0.007	20	0.007	20	0.013	16	0.007
2/18/15	15	0.006	30	0.006	27	0.026	21	0.058
2/19/15	20	0.006	21	0.006	26	0.025	18	0.006
2/20/15	3	0.006	6	0.000	8	0.007	5	0.007
2/23/15	23	0.006	22	0.006	29	0.038	22	0.006
2/24/15	16	0.006	31	0.020	30	0.033	20	0.013
2/25/15	23	0.013	29	0.007	33	0.040	18	0.007
2/26/15	12	0.000	20	0.007	23	0.007	14	0.013
2/27/15	9	0.006	14	0.006	17	0.019	14	0.006

Monthly Avg. TSP	13	19	20	15
Monthly Avg. Pb	0.006	0.006	0.019	0.011
Jan-15	0.008	0.009	0.016	0.025
Dec-14	0.005	0.005	0.008	0.009
Rolling 3-Month	0.006	0.007	0.014	0.015

Three month rolling average must be less than 0.15 ug/m3

NOTES:

Big River #4: 2/10, <23hr run time

Soccer Park #2: 2/4, <23hr run time

Ozark #1: 2/5, <23hr run time

	Big River QA	
Sample Date	TSP ug/m3	Lead ug/m3
2/3/15	9	0.007
2/5/15	10	0.006
2/10/15	18	0.006
2/12/15	15	0.006
2/17/15	13	0.006
2/19/15	16	0.006
2/24/15	17	0.006

Leadwood

Sample Results for **February-2015**

Sample Date	Big River #4		Leadwood South #1		Leadwood East #2		Leadwood North #3	
	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3	TSP ug/m3	Lead ug/m3
2/2/15	12	0.006	7	0.007	8	0.007	12	0.007
2/3/15	8	0.006	10	0.006	11	0.006	11	0.007
2/4/15	11	0.000	13	0.007	12	0.000	12	0.000
2/5/15	9	0.006	13	0.006	12	0.006	9	0.000
2/6/15	8	0.006	16	0.006	12	0.000	9	0.000
2/9/15	8	0.006	15	0.013	10	0.007	8	0.000
2/10/15	invalid	invalid	13	0.006	16	0.013	11	0.007
2/11/15	12	0.006	18	0.013	7	0.000	8	0.000
2/12/15	11	0.006	32	0.026	8	0.007	9	0.000
2/13/15	21	0.006	33	0.006	22	0.006	22	0.007
2/16/15	15	0.000	12	0.006	10	0.000	8	0.000
2/17/15	10	0.007	18	0.006	13	0.006	15	0.000
2/18/15	15	0.006	20	0.019	18	0.006	16	0.006
2/19/15	20	0.006	20	0.025	19	0.006	14	0.006
2/20/15	3	0.006	10	0.006	0	0.000	4	0.000
2/23/15	23	0.006	26	0.032	29	0.013	21	0.007
2/24/15	16	0.006	14	0.019	17	0.006	14	0.007
2/25/15	23	0.013	21	0.026	30	0.013	20	0.007
2/26/15	12	0.000	21	0.032	3	0.000	14	0.000
2/27/15	9	0.006	18	0.018	17	0.012	13	0.006

Monthly Avg. TSP	13		18		14		13	
Monthly Avg. Pb		0.006		0.014		0.006		0.003
Jan-15		0.008		0.011		0.006		0.005
Dec-14		0.005		0.007		0.005		0.004
Rolling 3-Month		0.006		0.011		0.006		0.004

Three month rolling average must be less than 0.15 ug/m3

NOTES: Big River #4: 2/10, <23hr run time

Sample Date	Big River QA	
	TSP ug/m3	Lead ug/m3
2/3/15	9	0.007
2/5/15	10	0.006
2/10/15	18	0.006
2/12/15	15	0.006
2/17/15	13	0.006
2/19/15	16	0.006
2/24/15	17	0.006

Federal Site

Sample Results for **February-2015**

Sample Date	St. Joe (Ballfields) PM10 (ug/m3)	Big River#4 PM10 (ug/m3)	Water Treatment PM10 (ug/m3)
2/2/15	0	2	1
2/5/15	6	4	8
2/8/15	3	9	8
2/11/15	12	invalid	9
2/14/15	12	11	11
2/17/15	11	12	12
2/20/15	11	10	10
2/23/15	13	12	7
2/26/15	11	invalid	10

Compliance with NAAQS is less than 150 ug/m3

Monthly Avg. PM10	9	9	9
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NOTES: Big River #4: 2/11, <23hr run time
Big River #4: 2/26, >25hr run time

Sample Date	Big River QA PM10 (ug/m3)
2/5/15	3
2/11/15	11
2/17/15	13
2/23/15	18

Rivermines

Sample Results for **February-2015**

Sample Date	Big River #4 PM10 (ug/m3)	Rivermines South #1 PM10 (ug/m3)	Rivermines North #2 PM10 (ug/m3)	Rivermines East #3 PM10 (ug/m3)
2/2/15	2	5	2	1
2/5/15	4	6	10	8
2/8/15	9	13	10	8
2/11/15	invalid	invalid	9	9
2/14/15	11	14	10	11
2/17/15	12	invalid	10	12
2/20/15	10	16	12	10
2/23/15	12	9	2	7
2/26/15	invalid	10	8	10

Compliance with NAAQS is less than 150 ug/m3

Monthly Avg. PM10	9	10	8	9
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NOTES:

Big River #4: 2/11, <23hr run time
Big River #4: 2/26, >25hr run time

Rivermines South #1:
2/11, <23hr run time
2/17, <23 hr run time, hour meter failed,
new hour meter installed.

Sample Date	Big River QA PM10 (ug/m3)
2/5/15	3
2/11/15	11
2/17/15	13
2/23/15	18

National Site

Sample Results for **February-2015**

	Big River #4	Ozark #1	Soccer Park #2	Water Treatment
Sample Date	PM10 (ug/m3)	PM10 (ug/m3)	PM10 (ug/m3)	PM10 (ug/m3)
2/2/15	2	1	2	1
2/5/15	4	1	8	8
2/8/15	9	8	8	8
2/11/15	invalid	14	14	9
2/14/15	11	12	11	11
2/17/15	12	16	15	12
2/20/15	10	10	11	10
2/23/15	12	11	15	7
2/26/15	invalid	9	55	10

Compliance with NAAQS is less than 150 ug/m3

Monthly Avg. PM10	9	9	16	9
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NOTES: Big River #4: 2/11, <23hr run time
Big River #4: 2/26, >25hr run time

	Big River QA
Sample Date	PM10 (ug/m3)
2/5/15	3
2/11/15	11
2/17/15	13
2/23/15	18

Leadwood

Sample Results for **February-2015**

Sample Date	Big River #4 PM10 (ug/m3)	Leadwood South #1 PM10 (ug/m3)	Leadwood East #2 PM10 (ug/m3)	Leadwood North #3 PM10 (ug/m3)
2/2/15	2	3	5	12
2/5/15	4	6	6	3
2/8/15	9	12	14	10
2/11/15	invalid	11	7	11
2/14/15	11	12	13	12
2/17/15	12	6	15	13
2/20/15	10	9	11	10
2/23/15	12	3	10	15
2/26/15	invalid	4	7	6

Compliance with NAAQS is less than 150 ug/m3

Monthly Avg. PM10	9	7	10	10
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NOTES:

Big River #4: 2/11, <23hr run time

Big River #4: 2/26, >25hr run time

Sample Date	Big River QA PM10 (ug/m3)
2/5/15	3
2/11/15	11
2/17/15	13
2/23/15	18

Meterological Data - Old Lead Belt

February-2015

24hr average

Date	Wind Speed (MPH)	Wind Direction	Sigma-Theta	Temperature (C)	Air Pressure (mmHg)	Rain (Inches)	Power Supply (Volts)
01-Feb-15	6.0	248	22.30	3.5	740	0.48	13.67
02-Feb-15	5.8	297	24.19	-6.0	751	0	13.81
03-Feb-15	5.0	206	21.50	0.2	750	0	13.78
04-Feb-15	6.5	310	20.88	1.2	750	0	13.70
05-Feb-15	3.7	22	32.10	-7.2	757	0.02	13.87
06-Feb-15	5.3	203	18.86	2.3	750	0	13.74
07-Feb-15	7.6	196	17.70	9.3	742	0	13.57
08-Feb-15	6.8	254	18.13	13.3	739	0	13.47
09-Feb-15	8.0	352	17.06	2.3	748	0	13.65
10-Feb-15	2.9	79	34.99	-0.3	749	0	13.72
11-Feb-15	5.7	299	21.58	0.4	749	0	13.73
12-Feb-15	7.6	336	19.92	-5.4	755	0	13.79
13-Feb-15	4.7	201	19.98	-2.1	751	0	13.80
14-Feb-15	7.1	321	24.74	-1.4	750	0	13.76
15-Feb-15	5.5	70	24.58	-9.2	756	0	13.95
16-Feb-15	4.7	3	17.37	-8.5	749	0	13.91
17-Feb-15	3.2	244	22.84	-5.9	746	0.01	13.90
18-Feb-15	6.9	299	18.34	-9.7	750	0	13.85
19-Feb-15	3.5	253	27.17	-12.9	756	0	13.95
20-Feb-15	6.1	168	24.92	-6.5	749	0	13.91
21-Feb-15	2.0	321	12.02	0.4	745	0.42	13.81
22-Feb-15	8.0	352	17.61	-2.8	756	0.04	13.80
23-Feb-15	5.9	28	25.19	-10.0	761	0	13.93
24-Feb-15	4.4	230	20.72	-3.0	747	0.27	13.84
25-Feb-15	2.7	146	26.63	-1.4	743	0	13.84
26-Feb-15	7.6	335	18.78	-5.1	750	0	13.86
27-Feb-15	3.9	23	29.50	-10.1	760	0	13.95
28-Feb-15	3.5	102	25.05	-5.4	759	0	13.90

INQUEST
ENVIRONMENTAL INC.

3609 Mojave Ct., Ste E ♦ COLUMBIA, MO 65202
(573) 474-8110 ♦ FAX: (573) 474-8371

March 2, 2015

Mr. Greg Henson
Chemist
The Doe Run Company
881 Main Street
Herculaneum, Missouri 63048

RE: 1st Quarter 2015 Lead/PM10 Samplers and Meteorological System
Performance Audit Report.

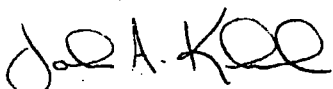
Dear Mr. Henson,

Please find enclosed the worksheets detailing the Lead/PM10 sampler's one-point flow verifications and meteorological sensors accuracy checks that were recently performed on the Doe Run Park Hills Monitoring Network. A copy of the current certifications for the audit devices that were used has also been enclosed.

All of the verifications and checks were found to be within expected guidelines.

After reviewing the enclosed information, please feel free to call with any comments or questions. Thank you for your business.

Sincerely,



John A. Kunkel
Inquest Environmental, Inc.

PM10 Sampler Verifications

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Leadwood (Mill St.)	Intercept (Qa)	-0.00876
Sampler	#2 PM10	Temperature	11.0 °C 284.2 °K
Flow Controller	P1018	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.20	1.057	23.80	44.45	0.942	1.127	6.62	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.70	44.26	0.942	1.127	1.052	-6.90	± 10%

Calculations:

Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

INQUEST
Environmental, Inc.

PM10 Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Leadwood (School)	Intercept (Qa)	-0.00876
Sampler	#3 PM10	Temperature	11.0 °C 284.2 °K
Flow Controller	P6071	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.30	1.073	23.10	43.14	0.943	1.138	6.06	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.00	42.96	0.944	1.139	1.070	-5.31	± 10%

Calculations:

Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Leadwood (South)	Intercept (Qa)	-0.00876
Sampler	#1 PM10	Temperature	11.0 °C 284.2 °K
Flow Controller	P1500	Station Pressure	30.03 "Hg 762.8 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.20	1.057	24.00	44.82	0.941	1.125	6.43	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.80	44.45	0.942	1.126	1.054	-6.73	± 10%

Calculations:

 Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

 Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

INQUEST
Environmental, Inc.**PM10 Sampler Audit**
Volumetric Flow Control3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Big River	Intercept (Qa)	-0.00876
Sampler	#4 Primary PM10	Temperature	11.0 °C 284.2 °K
Flow Controller	P2952	Station Pressure	30.05 "Hg 763.3 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.20	1.057	23.90	44.64	0.942	1.113	5.30	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.60	44.08	0.942	1.113	1.054	-6.73	± 10%

Calculations:Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Big River	Intercept (Qa)	-0.00876
Sampler	#4 QA PM10	Temperature	11.0 °C 284.2 °K
Flow Controller	P1019	Station Pressure	30.05 "Hg 763.3 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.30	1.073	24.40	45.57	0.940	1.124	4.75	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
24.50	45.76	0.940	1.124	1.071	-5.22	± 10%

Calculations:

Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

INQUEST
Environmental, Inc.**PM10 Sampler Audit**
Volumetric Flow Control3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Hanley Park/Crane St.	Intercept (Qa)	-0.00876
Sampler	#2 PM10	Temperature	10.0 °C 283.2 °K
Flow Controller	P2949	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.20	1.055	23.20	43.33	0.943	1.109	5.12	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.10	43.14	0.943	1.109	1.052	-6.90	± 10%

Calculations:Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	St Joe Park	Intercept (Qa)	-0.00876
Sampler	#4 PM10	Temperature	10.0 °C 283.2 °K
Flow Controller	P4353	Station Pressure	30.03 "Hg 762.8 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.10	1.039	23.50	43.89	0.942	1.102	6.06	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.60	44.08	0.942	1.102	1.035	-8.41	± 10%

Calculations:

 Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

 Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Wtr Plnt)	Intercept (Qa)	-0.00876
Sampler	#3 PM10	Temperature	10.0 °C 283.2 °K
Flow Controller	P2951	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.20	1.055	23.10	43.14	0.943	1.116	5.78	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.30	43.52	0.943	1.116	1.051	-6.99	± 10%

Calculations:Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Quarry)	Intercept (Qa)	-0.00876
Sampler	#1 PM10	Temperature	10.0 °C 283.2 °K
Flow Controller	P4601	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.20	1.055	23.20	43.33	0.943	1.088	3.13	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.20	43.33	0.943	1.088	1.054	-6.73	± 10%

Calculations:Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

INQUEST
Environmental, Inc.**PM10 Sampler Audit**
Volumetric Flow Control3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Above Quarry)	Intercept (Qa)	-0.00876
Sampler	#2 PM10	Temperature	10.0 °C 283.2 °K
Flow Controller	P4507	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.20	1.055	23.30	43.52	0.943	1.108	5.02	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.40	43.70	0.943	1.108	1.052	-6.90	± 10%

Calculations:Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Ozark Insul. (National)	Intercept (Qa)	-0.00876
Sampler	#1 PM10	Temperature	10.0 °C 283.2 °K
Flow Controller	P2950	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.20	1.055	23.30	43.52	0.943	1.112	5.40	± 7%

Sampler Operating Flow Rate						
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.20	43.33	0.943	1.112	1.052	-6.90	± 10%

Calculations:

Pressure mmHg (Pf) - ("H₂O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

Lead/TSP Sampler Verifications

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Big River Primary	Intercept (Qa)	-0.00876
Sampler	#4 TSP	Temperature	10.0 °C 283.2 °K
Flow Controller	P4557	Station Pressure	30.03 "Hg 762.8 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.80	1.149	23.80	44.47	0.942	1.205	4.87	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
24.10	45.03	0.941	1.204	1.145	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Big River QA	Intercept (Qa)	-0.00876
Sampler	#4 TSP	Temperature	10.0 °C 283.2 °K
Flow Controller	P4558	Station Pressure	30.03 "Hg 762.8 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.80	1.149	23.50	43.91	0.942	1.201	4.53	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.60	44.09	0.942	1.201	1.147	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Leadwood Mill St.	Intercept (Qa)	-0.00876
Sampler	#2 TSP	Temperature	11.0 °C 284.2 °K
Flow Controller	P4476	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.70	1.136	23.10	43.16	0.943	1.196	5.28	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.10	43.16	0.943	1.196	1.133	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

INQUEST
Environmental, Inc.**Lead Sampler Audit**
Volumetric Flow Control3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Leadwood School	Intercept (Qa)	-0.00876
Sampler	#3 TSP	Temperature	11.0 °C 284.2 °K
Flow Controller	P6793	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.70	1.136	23.60	44.09	0.942	1.192	4.93	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.50	43.91	0.942	1.192	1.133	1.10 - 1.70

Calculations:Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

INQUEST
Environmental, Inc.**Lead Sampler Audit**
Volumetric Flow Control3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Leadwood South	Intercept (Qa)	-0.00876
Sampler	#1 TSP	Temperature	11.0 °C 284.2 °K
Flow Controller	P4559	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.70	1.136	23.70	44.28	0.942	1.211	6.60	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.70	44.28	0.942	1.211	1.131	1.10 - 1.70

Calculations:Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

INQUEST
Environmental, Inc.**Lead Sampler Audit**
Volumetric Flow Control3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	St Joe Park	Intercept (Qa)	-0.00876
Sampler	#4 TSP	Temperature	10.0 °C 283.2 °K
Flow Controller	P6792	Station Pressure	30.03 "Hg 762.8 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.70	1.134	23.20	43.35	0.943	1.198	5.64	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.30	43.53	0.943	1.198	1.130	1.10 - 1.70

Calculations:Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Hanley Park (National)	Intercept (Qa)	-0.00876
Sampler	#2 TSP	Temperature	10.0 °C 283.2 °K
Flow Controller	P4474	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.60	1.119	23.40	43.72	0.943	1.189	6.26	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.60	44.09	0.942	1.187	1.113	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Water Plant)	Intercept (Qa)	-0.00876
Sampler	TSP	Temperature	10.0 °C 283.2 °K
Flow Controller	P4475	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.70	1.134	23.20	43.35	0.943	1.195	5.38	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.20	43.35	0.943	1.195	1.131	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Quarry)	Intercept (Qa)	-0.00876
Sampler	#1 TSP	Temperature	10.0 °C 283.2 °K
Flow Controller	P2940	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.60	1.119	23.90	44.65	0.941	1.197	6.97	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.90	44.65	0.941	1.197	1.114	1.10 - 1.70

Calculations:Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

INQUEST
Environmental, Inc.**Lead Sampler Audit**
Volumetric Flow Control3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Above Quarry)	Intercept (Qa)	-0.00876
Sampler	#2 TSP	Temperature	10.0 °C 283.2 °K
Flow Controller	P2941	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.70	1.134	23.70	44.28	0.942	1.200	5.82	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
23.60	44.09	0.942	1.200	1.130	1.10 - 1.70

Calculations:Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

Date	January 20, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Ozark Insul (National)	Intercept (Qa)	-0.00876
Sampler	#1 TSP	Temperature	10.0 °C 283.2 °K
Flow Controller	P2939	Station Pressure	30.04 "Hg 763.0 mmHg

Flow Rate Audit							
Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H ₂ O	Flow Rate m ³ /min	Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min		
3.80	1.149	23.00	42.97	0.944	1.201	4.53	± 7%

Sampler Operating Flow Rate					
Manometer "H ₂ O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m ³ /min	Corrected Flow Rate	Acceptable Range
22.90	42.78	0.944	1.204	1.150	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H₂O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H₂O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

Calibration Orifice Certification Worksheet



TISCH ENVIRONMENTAL, INC.
145 SOUTH MIAMI AVE
VILLAGE OF CLEVELAND, OH
45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5028A

Date - Jan 13, 2015 Rootsmeter S/N 9833620 Ta (K) - 292
Operator Tisch Orifice I.D. - 1882 Pa (mm) - 765.81

PLATE OR VDC #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.3360	4.3	1.50
2	NA	NA	1.00	1.0560	6.8	2.50
3	NA	NA	1.00	0.9570	8.2	3.00
4	NA	NA	1.00	0.8870	9.5	3.50
5	NA	NA	1.00	0.6670	16.5	6.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
1.0225	0.7654	1.2420		0.9943	0.7443	0.7563
1.0191	0.9651	1.6034		0.9910	0.9385	0.9763
1.0173	1.0630	1.7564		0.9892	1.0337	1.0695
1.0155	1.1449	1.8972		0.9875	1.1133	1.1552
1.0061	1.5084	2.4840		0.9784	1.4668	1.5125
Qstd slope (m) = 1.66236				Qa slope (m) = 1.04094		
intercept (b) = -0.01438				intercept (b) = -0.00676		
coefficient (r) = 0.99927				coefficient (r) = 0.99927		
y axis = SQRT[H2O(Pa/760) (298/Ta)]				y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol [(Pa-Diff. Hg)/760] (298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760) (298/Ta))] - b}
Qa = 1/m{[SQRT H2O(Ta/Pa)] - b}

Meteorological Sensor's Accuracy Checks

Inquest Environmental, Inc.

Wind Direction Sensor Performance Audit

Operator The Doe Run Co
 Location Big River
 Station Name Meteorological System
 Technician J Kunkel / M Kunkel

Date 01/15/2015
 Start Time 07:45
 Stop Time 08:45

Sensor Mfg RM Young
 Sensor Model Wind Monitor AQ
 Serial Number 128618
 Sensor Height 10.0 Meters

Station Declination 1.1 Deg
 Measured Angle 180.0 Deg
 Corrected Angle 181.1 Deg
 Alignment Error -1.1 Deg

Vane Angle Degrees	Data Logger Degrees	Results	
		Difference ± 3 Deg Limit	Total Error ± 5 Deg Limit
0/360	0.9	0.9	-0.2
90	90.4	0.4	-0.7
180	180.5	0.5	-0.6
270	271.4	1.4	0.3

Average Difference (Degrees)	0.8
Average Total Error (Degrees)	-0.3

Audit Device	Wind Vane Alignment	Direction
Type	Pocket Transit	Vane Angle Fixture
Mfg.	Brunton	R.M. Young
Model	5008	18212
Serial No.	5080304492	None

Comments: Wind direction was verified by determining the orientation of the sensor in respect to True North. This was measured using a tri-pod mounted transit aligned along the length of the sensor while locked from rotating. A magnetic declination of 1.1 degrees was used to determine True North. The linearity of the sensor was determined by aligning the sensor to an indexed test fixture provided by the manufacturer. The four cardinal directions were verified using the fixture. No adjustments were made to the sensor.

Inquest Environmental, Inc.

Wind Speed Sensor Performance Audit

Operator The Doe Run Co
 Location Big River
 Station Name Meteorological System
 Auditor(s) J Kunkel / M Kunkel

Date 01/15/2015
 Start Time 07:45
 Stop Time 08:45

Sensor Mfg RM Young
 Sensor Model Wind Monitor AQ
 Serial Number 128618
 Sensor Height 10.0 Meters

Audit Standard		DAS Response		Limit
RPM	M/S	M/S	Difference	M/S
Zero	0.00	0.00	0.00	0.25
300	1.54	1.53	-0.01	0.25
600	3.07	3.07	0.00	0.25
1200	6.14	6.14	0.00	0.56
1800	9.22	9.22	0.00	0.71
3600	18.43	18.44	0.01	1.17
5400	27.65	27.63	-0.02	1.63
7200	36.86	36.85	-0.01	2.09
Average			0.00	

± (0.25 m/s + 5%)

Audit Device	Anemometer Drive
Type	Variable Speed
Mfg.	R.M. Young
Model	18801
Serial No.	CAO1631

Comments: Wind speed was verified using a variable speed anemometer drive. The propellor was removed from the sensor and the drive was connected using a flexible connector. The sensor was then rotated in the appropriate direction at several different speeds. Sensor responses were taken from the data logger. No adjustments were made to the sensor.

Inquest Environmental, Inc.

Temperature Sensor Performance Audit

Operator The Doe Run Co
 Location Big River
 Station Name Meteorological System
 Technician J Kunkel / M Kunkel

Date 01/15/2015
 Start Time 07:45
 Stop Time 08:45

Sensor Information

Sensor Mfg Climatronics
 Sensor Model NA
 Serial Number NA
 Sensor Height 2 meters

Audit Device °C	Sensor	
	Data Logger °C	Difference °C
-0.8	-0.9	-0.1
29.1	29.0	-0.1
55.9	55.7	-0.2
Average		-0.1

Note: The limit for each point is +/- 0.5 °C

Audit Device	
Type	Digital Thermometer
Mfg.	Control Company
Model	15-077-8
Serial No.	221381404

Comments: The temperature is verified by co-locating the sensor with a certified digital thermometer. The verification is conducted at three levels using two water baths (iced and hot water) and the ambient temperature. The sensor error was determined by comparing the sensor's data logger response to the display on the certified digital thermometer. No adjustments were made to the sensor.

Inquest Environmental, Inc.
Barometric Pressure Sensor Performance Audit

Operator The Doe Run Co
Location Big River
Station Name Meteorological System
Technician J Kunkel / M Kunkel

Date 01/15/2015
Start Time 07:45
Stop Time 08:45

Sensor Mfg Setra
Sensor Model 276
Serial Number 2626447

Audit Device	Data Logger Response	
	BP mm HG	Difference mm HG
747.10	750.40	3.30

Note: Limit is +/- 7.5 mm HG.

Audit Device	
Type	Digital Barometer
Mfg.	AIR
Model	AIR-HB-1A
Serial No.	6G3745

Comments: The barometric pressure is verified by co-locating the sensor with a certified
digital barometer. The verification was conducted at one level after
allowing the sensor and calibration device ample time to stabilize.
The sensor error was determined by comparing the sensor's data logger
response to the display on the certified digital barometer. No
adjustments were made to the sensor.

Inquest Environmental, Inc.

Precipitation Gauge Performance Audit

Operator The Doe Run Co
Location Big River
Station Name Meteorological System
Technician J Kunkel / M Kunkel

Date 01/15/2015
Start Time 07:45
Stop Time 08:45

Sensor Mfg Texas Electronics
Sensor Model TR525I
Serial Number 36611-805
Diameter (inches) 6.00

Audit Device	Data Logger Response	
	Gauge	Difference
Known Tips	Tips	%
96.00	93.00	-3.13

Note: Limit is +/- 10%.

Audit Device	
Type	Graduated Beaker
Mfg.	Texas Instruments
Model	FC-525
Serial No.	NA

Comments: The precipitation gauge output was verified using a field calibration kit
supplied by the manufacturer. The kit consists of a graduated beaker
and a calibration funnel using a precision orifice at the water outlet.
Water was measured in the beaker and poured into the funnel while
mounted on the gauge. The amount of precipitation recorded by the
data logger was then compared to the known amount of water passing
through the funnel. 100 tips equals one inch of rainfall. The gauge
was cleaned and no adjustments were made.

Meteorological Audit Devices Certifications

BRUNTON OUTDOOR GROUP

CERTIFICATE OF CALIBRATION

Equipment Owner

Name: Inquest Environmental Mitch Kunkel
Address: 3609 Mojave Court, Ste E
Columbia MO 65207

Calibration traceable to the National Institute of Standards and Technology in accordance with MIL-STD-45662A has been accomplished on the instrument listed below by comparison with standards maintained by the Brunton Outdoor Group. The accuracy and stability of all standards maintained by the Brunton Outdoor Group are traceable to national standards maintained by the National Institute of Standards and Technology in Washington, D.C. and Boulder, CO. Completed record of all work performed is maintained by the Brunton Outdoor Group and is available for inspection upon request.

This unit has been calibrated to Lietz TM10^E serial number 30937 traceable to N.B.S. Number 738227675 this July Day 30 20 14.

Description Pocket Transit

Purchase Order 256430329

Order Number 50-070367

Model Number F-5008

Serial Number 5080304492

Calibration Date 7/30/14

Recalibration Date 7/30/15

Signed Edie Russell 7/30/14

Quality Control Coordinator



CALIBRATION PROCEDURE
18801/18810 ANEMOMETER DRIVE

DWG: CP18801(A)

REV: C101107

PAGE: 2 of 4

BY: TJT

DATE: 10/11/07

CHK: JC

W.C. GAS-12

CERTIFICATE OF CALIBRATION AND TESTING

MODEL: 18801 (Comprised of Models 18820 Control Unit & 18830 Motor Assembly)
SERIAL NUMBER: CA01631

R. M. Young Company certifies that the above equipment was inspected and calibrated prior to shipment in accordance with established manufacturing and testing procedures. Standards established by R.M. Young Company for calibrating the measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology.

Nominal Motor Rpm	Output Frequency Hz (1)	Calculated Rpm (2)	Indicated Rpm (3)
600	320	600	600
1200	640	1200	1200
2400	1280	2400	2400
4200	2240	4200	4200
6,000	3200	6000	6000
8,100	4320	8100	8100
9,900	5280	9900	9900
<input checked="" type="checkbox"/> Clockwise and Counterclockwise rotation verified			

- (1) Measured at the optical encoder output.
(2) Frequency output produces 32 pulses per revolution of motor shaft.
(3) Indicated on the Control Unit LCD display.

* Indicates out of tolerance

☒ No Calibration Adjustments Required

☐ As Found

☐ As Left

Traceable frequency meter used in calibration Model: DP5740 SN: AB63

Date of inspection 10 Dec 2014
Inspection Interval One Year

Tested By EC



Calibration
Certificate No. 1750.01

Calibration complies with ISO/IEC
17025, ANSI/NCSL Z540-1, and 9001



Cert. No.: 4000-5872220

Traceable® Certificate of Calibration for Digital Thermometer

Cust ID: Inquest Environmental Inc., 3609 Mojave Ct. Suite E, Attn. Mitchell Kunkel, Columbia, MO 65202 U.S.A. (RMA:986002)

Instrument Identification:

Model Numbers: 15-077-8, FB50266, 245BY S/N: 221381404 Manufacturer: Control Company

Model: 15-077-7 S/N: 51202300

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	2/24/15	1000351744
Temperature Probe	128	3/12/15	15-CJ73J-4-1
Temperature Calibration Bath TC-218	A73332		
Thermistor Module	A27129	10/25/14	1000346002
Temperature Probe	5202	11/30/14	15-B15PW-1-1
Temperature Calibration Bath TC-256	B01375		
Thermistor Module	A27129	10/25/14	1000346002
Temperature Probe	5267	10/19/15	15-CD5J7-1-1

Certificate Information:

Technician: 68

Procedure: CAL-06

Cal Date: 4/14/14

Cal Due: 4/14/15

Test Conditions: 22.5°C 50.0 %RH 1007 mBar

Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C	0.000	0.106	N	0.000	-0.001	Y	-0.050	0.050	0.013	3.8:1
°C	25.001	25.097	N	25.001	24.999	Y	24.951	25.051	0.023	2.2:1
°C	60.000	60.103	N	60.000	60.000	Y	59.950	60.050	0.014	3.6:1
°C	100.004	100.082	N	100.004	99.997	Y	99.954	100.054	0.018	2.8:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = As Left Nominal(Rounded) - Tolerance; Max = As Left Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice
Aaron Judice, Technical Manager

Maintaining Accuracy:

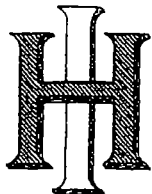
In our opinion once calibrated your Digital Thermometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Digital Thermometers change little, if any at all, but can be affected by aging, temperature shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Control Company is an ISO 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01
Control Company is ISO 9001:2008 Quality Certified by (DNV) Det Norske Veritas Certificate No. CERT-01805-2006-AQ-HOU-RvA
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).



HASS INSTRUMENT CORPORATION

6711 OLD BRANCH AVENUE • CAMP SPRINGS, MD 20748-6990 • (301) 449-5454 • FAX (301) 449-5455

CALIBRATION REPORT

BAROMETER/ALTIMETER
AIR Model AIR-HB-1A
Serial No. 6G3745

TEST POINT	TEST PRESSURE	DIGITAL READOUT	READOUT ERROR	CORRECTION REQUIRED
1	930.00	931.9	+1.9	-1.9
2	970.00	971.9	+1.9	-1.9
3	1010.00	1012.0	+2.0	-2.0
4	1050.00	1051.9	+1.9	-1.9
5	1018.01	1019.9	+1.9	-1.9

NOTES:

1. All data are in Millibars (hPa) and were taken at 75 F (24 C).
2. To correct the Digital Readout of the instrument, either algebraically add the CORRECTION REQUIRED to, or algebraically subtract the READOUT ERROR from, the readout shown on the instrument.
3. The TEST PRESSURE was generated using Type A-1 Barometer S/N 3327, and was approached in an increasing-pressure direction.
4. The TEST PRESSURE for TEST POINT 5 was ambient atmospheric pressure.
5. The BAROMETER/ALTIMETER was horizontal during the calibration.
6. The LCD screen of the BAROMETER/ALTIMETER has some trash in the center of the display, but it does not interfere with the readout.
7. Although the Digital Readout of the instrument can be adjusted to incorporate the average CORRECTION REQUIRED, this has not been done.

Calibration Date: 5 February 2014

By: Bernard I. Hass

Bernard I. Hass

(SEAL)